## REMARKS

This amendment is responsive to the Office Action of June 3, 2008. Reconsideration and allowance of claims 1- 20 are requested.

### The Present Amendment Should Be Entered

The present amendment raises no issues which would require further search or consideration.

First, the specification has been amended to substitute the corresponding US patent for the referenced PCT application.

Second, this amendment places claim 6 in independent form including all of the material of its parent claims 1, 2, and 3. Because a dependent claim is read as including all of the limitations of its parent claims, placing claim 6 in independent form does not change its scope, and does not require further search or consideration.

### The Office Action

Claims 1, 2, 10, 13, 14, 15, 16, and 19 stand rejected under 35 U.S.C. § 103 as being unpatentable over Busse (US 6,653,636) in view of Abdalla ("Nuclear Instruments and Methods in Physics Research" article).

Claims 3-9, 17, and 18 stand rejected under 35 U.S.C. § 103 as being unpatentable over Busse in view of Abdalla, further modified by Kozlowski (US 6,417,504).

Claims 11, 12, and 20 stand rejected under 35 U.S.C. § 103 as being unpatentable over Busse in view of Abdalla, further modified by Marshall (US 6,858,912).

**The Claims Distinguish Patentably**
**Over the References of Record**

As discussed starting a page 1, line 27 of the present application, **Busse** discloses a pixel configuration which uses a unity gain buffer (21, 23) between the light sensing element and the sampling capacitor.

Furthermore, Busse relies on charge amplification resulting from the ratio of the size of the sampling capacitor (26) to the storage capacitance (2). Busse requires a large sampling capacitor (26). As a result, one problem in the Busse disclosure is the large amount of real estate required for a large sampling capacitor (26).

By contrast, instant claims 1 and 14 call for providing voltage gain through voltage amplification. This enables, for example, the sampling capacitor to be to a small size so that the pixel circuitry occupies the smallest possible space, thereby enabling large aperture pixels to be formed.

Additionally, Busse argues against replacing the unity isolation amplifier (21, 23) with an amplifier with a higher gain. The Applicants in Busse described the charge amplification as follows:

> The proposed solution has a particularly advantageous aspect which is formed by the stability of the transfer function of the circuit. <u>This gain stability of the circuit is due to the fact that the source follower transistor 21 has a stable voltage amplification amounting to 1 which is converted into a charge amplification $G_Q = C_S/C_P$ by means of the sampling capacitor 26</u>. (Busse col. 9, lines 8-23)(emphasis added).

The objective of using the charge capacitance with the stable voltage amplification of one is reiterated by the Busse Applicants in their summary of the invention:

> This object is achieved by means of a sensor which is characterized in that the means for amplifying include a respective source follower transistor whose gate is connected to the conversion element, whose source is connected an active load and to one side of a sampling capacitor, the other side of the sampling capacitor being connected to the read-out line via the read-out switching element, and that a

> respective reset element is connected to the conversion element in order to reset the conversion element to an initial state.
>
> The active load ideally constitutes a current source which impresses a constant channel current on the source follower transistor. The threshold voltage of the source follower transistor is thus stabilized; this threshold voltage is strongly dependent on the channel current, notably in the case of TFTs of amorphous silicon. <u>As a result of the stable threshold voltage, the condition for correct operation of the source follower transistor with adequate stability of the transfer function is satisfied. Therefore, the source follower transistor has a stable voltage amplification of 1. It is converted into a charge amplification $G_Q = C_S/C_P$ by the sampling capacitor, wherein $C_P$ is the capacitance on the conversion element and $C_S$ is the capacitance of the sampling capacitor.</u> The capacitance on the conversion element may again be an intrinsic storage capacitance of the conversion element or an additional capacitance. (Busse col. 2, lines 38-64)(emphasis added).

To modify the Busse device as suggested by the Office Action would obviate or destroy this object. As such, Busse teaches against the use of a voltage amplifier (16) having gain greater than 1.

It is unimaginable how one having knowledge of Busse and its objective of gain stability specifically due to a stable voltage amplification amounting to 1 would find it obvious to provide voltage gain greater than 1 through voltage amplification. Using voltage gain greater than 1 as proposed by the Examiner would destroy the objective of Busse in having a stable voltage amplification of 1. The Examiner has not explained what would motivate such a destruction of the objective other than his own hindsight. More importantly, since Busse does not disclose voltage amplification greater than 1, the Examiner is effectively suggesting that the invention in Busse could be obviously modified (i.e., modifying a stable voltage amplification at 1 <u>to be greater than 1</u>). But according to Busse, such a modification would prevent gain stability of the circuit since the gain stability of the circuit requires a stable voltage amplification at 1. As a result, the Busse invention would be destroyed by the Examiner's proposed modification. It is well settled that a §103 rejection based upon a modification of a reference that destroys the intent, purpose or

function of the invention disclosed in the *reference*, is not proper and the *prima facie* case of obviousness cannot be properly made. In short, there would be no technological motivation for engaging the modification or change. To the contrary, there would be a disincentive. *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984). Accordingly, it is respectfully submitted that the Office has not established a *prima facie* case of obviousness.

Accordingly, it is submitted that **claim 1 and claims 2-5, 7-13 and 20 dependent therefrom**, and **claim 14, along with claims 15-17 and 19 dependent therefrom,** distinguish patentably and unobviously over the references of record.

**Claim 5** further distinguishes over the applied references by calling for the capacitance of the sampling capacitor to be approximately equal to the capacitance of the storage capacitor. Kozlowski, relied upon by the Examiner, calls for the clamping capacitor to be at least 1 fF, while the detector capacitance is from 5 fF to over 125 fF. Thus, Kozlowski is consistent with Busse in calling of the sampling capacitor to be smaller than the detector capacitor which, as explained in Busse, provides for charge amplification. Because Kozlowski and Busse both teach against the limitations of claim 5, it is submitted that Kozlowski does not cure the shortcomings of Busse, and that **claim 5** distinguishes patentably and unobviously over the references of record.

**Claim 6** calls for the capacitance of the sampling capacitor to be in the range of 0.5 pF to 3 pF and the capacitance of the pixel storage capacitor to be in the range of 0.5 pF to 3 pF. By contrast, Kozlowski calls for the clamping capacitor to be in range of 1 fF and the detector capacitance to be in the range of 5 fF to 25 fF, or 25 fF to 125 fF. There is, of course, several orders of magnitude difference between pF and fF. There is no overlap between the range of 0.5 pF to 3 pF and any one of the range of 5 fF to 25 fF, 25 fF to 125 fF, or about 1 fF.

Because the Examiner has failed to recognize the orders of magnitude difference between picofarads (pF) and femtofarads (fF), it is submitted that Kozlowski does not show that which the Examiner alleges. Because Kozlowski does not suggest or render obvious a range of 0.5 pF to 3 pF for either a sampling capacitor or a pixel storage capacitor, it is submitted that **claim 6** distinguishes patentably and unobviously over the references of record.

**Claim 9** again calls for the range of 0.5 pF to 3 pF. Because Kozlowski does not disclose or fairly suggest this range much less suggest further modifying Busse modified by Abdalla, it is submitted that **claim 9** distinguishes patentably and unobviously over the references of record.

**Claim 10** calls for the gain of the voltage amplifier to be in the range of 2 to 5. By contrast, the referenced portion of Abdalla calls for a gain of 30. Amplification tends to amplify noise. By limiting the amplification range to 2 to 5, noise, a significant concern in Busse, is not amplified to the extend advocated by Abdalla. Because Abdalla suggests a gain of 30, it is submitted that Abdalla provides no motivation to modify Busse to have a gain of the voltage amplifier in the range of 2 to 5. Accordingly, it is submitted that **claim 10** distinguishes patentably and unobviously over the references of record.

**Claim 18** calls for the capacitance of the sampling capacitor to be approximately equal to the capacitance of the pixel storage capacitor. The Office Action acknowledges that Busse and Abdalla do not show this limitation. Rather, the Examiner looks to Kozlowski. But in Kozlowski, the clamping capacitance is around 1 fF; whereas, the detector capacitance is on the order of 5 fF to 25 fF, or 25 fF to 125 fF. There is nothing in Kozlowski which would motivate those of ordinary skill in the art to make the capacitance of the sampling and pixel storage capacitors approximately equal. Rather, Kozlowski teaches the reader that the detector capacitance should be many times the size of the clamping capacitance, i.e., teaches away from the limitations of claim 18. Accordingly, it is submitted that **claim 18** distinguishes patentably and unobviously over the references of record.

**Claim 19** calls for the gain of the voltage amplifier to be in the range of 2 to 5. By contast, Busse uses a unity gain voltage buffer. Abdalla uses an amplifier with a gain many times the claimed range of 2 to 5. It is submitted that there is nothing in Abdalla which would motivate those of ordinary skill in the art to alter the unity gain of Busse, much less select a gain in a range not shown in either Busse or Abdalla. Rather, it is submitted that such a radical reduction in the amplification suggested by Abdalla is contrary to the fair teachings of Abdalla. Accordingly, it is submitted that **claim 19** distinguishes patentably and unobviously over the references of record.

**Claim 20** calls for the second transistor **40** (the transistor whose gate is connected with the light sensitive element) to have a non-unity gain. In Busse, a unity gain is provided. In Abdalla, there is no indication whether or what gain transistors M5 and M6 provide, much less that they provide a non-unity gain. Accordingly, it is submitted that **claim 20** distinguishes patentably and unobviously over the references of record.

## Replacement Drawings

The applicants enclose two sheets of replacement drawings. In the replacement drawings, the control line for transistor **34** has been re-labeled as "**36**" for consistency with page 5, line 15 of the specification. This eliminates labeling both the control line for transistor **34** and transistor **38** with the same reference number. This amendment to the drawing includes no new matter.

## CONCLUSION

For the reasons set forth above, it is submitted that claims 1-20 distinguish patentably over the references of record. An early allowance of all claims is requested.

Respectfully submitted,

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